3.125 kHz from the main channel, with a bandwidth of 5 kHz. As discussed above, the biomedical telemetry industry is capable of carrying two data streams within an existing offset channel, using recently perfected digital technology to reduce the needed bandwidth (including guardbands) to approximately 12.5 kHz. The increasing demand of the medical profession for additional real-time patient data already is forcing telemetry system manufacturers to be as efficient with their use of spectrum as the state of the technological art will allow, within certain fairly inflexible power, weight and cost constraints.

Indeed, by at least one measure, the biomedical telemetry industry essentially meets the Commission's proposed efficiency requirement already: one telemetry data stream is carried by approximately 6.25 kHz of bandwidth. The problem, as was noted above, is that each telemetry "channel" (i.e., the continuous segment of spectrum authorized to be used by a given transmitter) now must accommodate at least two 6.25 kHz-wide data streams, and within the next decade, that channel must be able to carry up to six patient parameters.[7/]

7/ The existing level of efficiency achieved by the biomedical telemetry industry can be compared to the most advanced narrowband systems presently under development for general mobile services use, which appear to be capable of providing traditional voice and data services using a 5 kHz-wide channel. If these systems truly perform as promised, they can substantially increase the efficiency with which the spectrum is used by the vast majority of mobile services licensees. Unfortunately, these technical advances have little relevance for biomedical telemetry, particularly given the power and weight constraints under which medical systems must operate.

Thus, even if it is assumed that, over the course of the next ten years, the state of the art will advance to the point that the bandwidth needed to carry a present-day two-view telemetry signal could be reduced by a factor of two or three (not necessarily a safe assumption), the bandwidth problem faced by the telemetry industry would not be solved. In essence, a three-fold increase in efficiency would, at best, replicate the status quo, assuming arguendo that the Commission does not reduce the offset channel bandwidth below 12.5 kHz: today, SpaceLabs must fit two 6.25 kHz-wide signals into one channel; tomorrow, it will have to fit six 2 kHz-wide signals into that same space. If the Commission reduces the offset channel bandwidth to 5 kHz, the industry will have to compress each data stream to a bandwidth of less than 0.85 kHz in order to transmit simultaneously six real-time patient parameters.

It would be highly arbitrary simply to legislate a 5 kHz bandwidth for the offset channels without some reasonable assurance that the technology will be available to enable the industry to meet both that standard and the demands of the marketplace. No such technical solution appears on the horizon today. Nor does there appear to be an alternative solution available under the proposed rules. For example, while channel "stacking" may work for some main channel licensees, there does not appear to be any practical way in which a given number of 5 kHz-wide splinter channels -- which by definition always are separated by a higher power main channel (which presumably is in use) -- could be "packaged" in order to provide adequate

bandwidth for a six-parameter telemetry signal. Although such a "channel-hopping" system might be technically feasible, the additional cost of the necessary technology would be prohibitive for biomedical telemetry use.

C. Proposed Offset Channel And Adjacent Channel Power Levels Must Be Reduced.

In order to support the documented needs of the biomedical telemetry industry, the Commission not only must provide for wider bandwidth channels than currently is proposed, it must reduce the power levels permitted on both those channels and on adjacent channels. Under proposed Section 88.429, SpaceLabs has calculated that an adjacent channel operation employing the maximum permitted power must be at least 55 miles away from a standard biomedical telemetry operation in order to avoid interference to the telemetry system.[8/]

However, if the Commission would (1) increase the number of very low power (i.e., 10 mW maximum) offset channels reserved for biomedical telemetry in proposed Section 88.1299(b), and (2) impose a 100 mW limit on all adjacent channels, the separation requirement would be reduced to approximately one mile (depending on antenna height). Even a 1 watt power limit for adjacent channels -- which would result in a separation

---

8/ This calculation takes into account certain building penetration losses and other factors relevant to the circumstances involved in biomedical telemetry operations. Of course, even this 55-mile figure may be somewhat optimistic, because it does not take into account that a mobile station may be operating well within that 55-mile radius. This power level problem appears to undermine the potential utility of the 150-174 MHz and 216-220 MHz bands, which otherwise might be available for telemetry.

requirement of three miles -- would be a significant improvement over the current proposal.

A reduction in power levels for adjacent channels -- with strict restrictions on access to the reserved offset channels -- could provide a much more viable operating environment for biomedical telemetry. However, as noted supra, any such solution also must address the bandwidth problem.

D. The 450-470 MHz Offset Channels And Their Adjacent Main Channels Should Not Be Subject To Acquisition By An Exclusive Use Overlay Licensee.

SpaceLabs applauds the Commission's efforts in the NPRM to devise a regulatory scheme that provides incentives for maximizing the efficiency with which the spectrum is used by various private radio services. The exclusive use overlay ("EUO") licensing concept discussed in the NPRM (at 18-21) holds great potential in this respect. However, SpaceLabs fears that the incentives to maximize spectrum use inherent in the EUO plan are so intense that, if either the 450-470 MHz offset channels or their adjacent main channels were assigned to an EUO licensee, biomedical telemetry operations would be driven from the band.

As demonstrated supra, there are certain essential aspects to biomedical telemetry operations that distinguish them from other users of the 450-470 MHz band:

1. Telemetry systems must operate at very low power, due to concerns over portability, battery life, patient safety, and equipment costs;

2. Telemetry operations must provide continuous, error-free, real-time communications without interruption due to interference or other anomalies; and

3. Because telemetry operations generally are restricted to hospitals and other major medical facilities, coordination with telemetry licensees requires that small, randomly situated geographic pockets be accorded substantial protection from interference.

The logic of the incentives that are built into the EUO concept is per se at odds with protecting biomedical telemetry operations. The revenue-based incentive of an EUO licensee to maximize spectrum use is most likely to result in one of two responses to the needs of a hospital for upwards of 500 telemetry channels (of whatever bandwidth): (1) no such channels will be made available, because the EUO licensee can charge far more to a user seeking wide-area, high-power coverage; or (2) the channels will be available, but only at a price high enough to offset the revenue loss from having to protect telemetry users from both co-channel and adjacent channel interference from wide-area users.

Neither alternative is acceptable under any rational definition of the public interest, which must take into account the vital medical services provided by biomedical telemetry and the intense national effort to reduce healthcare costs. Thus, it is essential that the Commission not only fashion a regulatory scheme for the offset channels that will accommodate the rather inflexible technical requirements of biomedical telemetry, it also must ensure that the regulatory incentives it establishes for other services do not have the unintended effect of undermining the utility of the biomedical telemetry channels.

E. An Extended Transition Period Must Be Established For Biomedical Telemetry Operations On The Offset Channels.

As is demonstrated above, the biomedical telemetry industry always has been under intense marketplace pressure to maximize the efficiency with which it uses the spectrum. To date, those incentives have pushed the industry to the point at which two error-free, real-time, continuous data streams can successfully be transmitted by a portable, economically practical processor/transmitter, using approximately 12.5 kHz of bandwidth and less than 5 mW power. The marketplace -- with or without regulatory incentives -- will continue to impose great pressure on the industry to be more efficient.

However, not even the most optimistic technical scenario instills confidence that, in the foreseeable future, the same amount of information as is carried in 12.5 kHz today -- let alone three times as much data -- can successfully be delivered in a commercially viable manner using a 5 kHz channel. Absent an unanticipated technical breakthrough of significant magnitude, the move to 5 kHz offset channels should not occur for at least ten years.

IV. THE COMMISSION SHOULD BEGIN THE PROCESS OF ESTABLISHING A SEPARATE, PRIMARY ALLOCATION FOR BIOMEDICAL TELEMETRY SERVICES.

Several points are clear from the foregoing: (1) biomedical telemetry systems provide an essential medical service, the demand for which will continue to increase for the foreseeable future; (2) the existing allocations are, at best, marginally adequate to maintain the status quo and woefully

inadequate to sustain even modest future growth, let alone the dramatic expansion of biomedical telemetry services anticipated by all informed observers; and (3) it is questionable whether sufficient technical breakthroughs will occur within the next decade to enable biomedical telemetry systems to operate successfully under the regulatory regime proposed in the NPRM.

Put simply, an objective analysis of both the current state of affairs and the reasonably anticipated future leads to the conclusion that the Commission presently should begin the process of establishing a new, primary allocation for very low power biomedical telemetry services. Beginning that process now would enable the Commission to have a new allocation established well before the transition to the 5 kHz-wide offset channels.

As the Commission is aware, Congress is clearly ready -- with strong support from the Executive Branch -- to adopt legislation that will result in the reallocation to the private sector of a substantial amount of spectrum presently assigned to the federal government. It is reasonable to assume that the needs of biomedical telemetry could be met from this pool, particularly if the process of identifying those needs and communicating them to the National Telecommunications and Information Administration were to begin now.

Thus, while SpaceLabs strongly encourages the Commission to modify its refarming proposal to better accommodate the needs of the biomedical telemetry industry within the confines of new Part 88 of the Rules, it must be emphasized that the most rational long-term solution is a separate, primary

allocation. The conjunction of the refarming transition and the federal reallocation presents the Commission with an excellent opportunity to fashion timely and durable relief for this vital industry.

CONCLUSION

Based on the foregoing, SpaceLabs requests that the Commission provide the regulatory relief needed to ensure the long-term viability of wireless biomedical telemetry.

Respectfully submitted,

SPACELABS MEDICAL, INC.

By: _____
Jeffrey H. Olson

PAUL, WEISS, RIFKIND, WHARTON & GARRISON
1615 L Street, N.W., Suite 1300
Washington, D.C. 20036
Telephone: 202-223-7300
Facsimile: 202-223-7420

Its Attorney

May 28, 1993